EFFECTS OF SYNTHESIS PARAMETERS ON PROPERTIES OF CARBIDE DERIVED CARBON FORMED ON SIC

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Abstract

Carbide derived carbon (CDC) is formed when the metal component of a ceramic carbide is extracted at a temperature low enough that the residual carbon cannot relax into the equilibrium structure. CDC structures contain nanostructured amorphous carbon with substantial porosity, carbon onions and diamond structures. CDC can be produced on SiC by exposure to chlorine containing gases at temperatures in excess of 800^{o}C so that the silicon is removed as volatile silicon chlorine compounds. The growth kinetics and properties of the CDC are influenced by the temperature of the reaction and the presence of additional gas species (particularly hydrogen) in the reactive gas mixture.

The properties of CDC formed on SiC are of particular interest because CDC layers can improve the tribological performance of SiC components in bearings and other sliding friction applications. The effects of temperature and reactive gas composition on the growth rate, hardness, friction coefficient and chlorine content of CDC layers has been investigated with the goal of identifying the processing conditions which produce the best combination of properties for sliding wear.